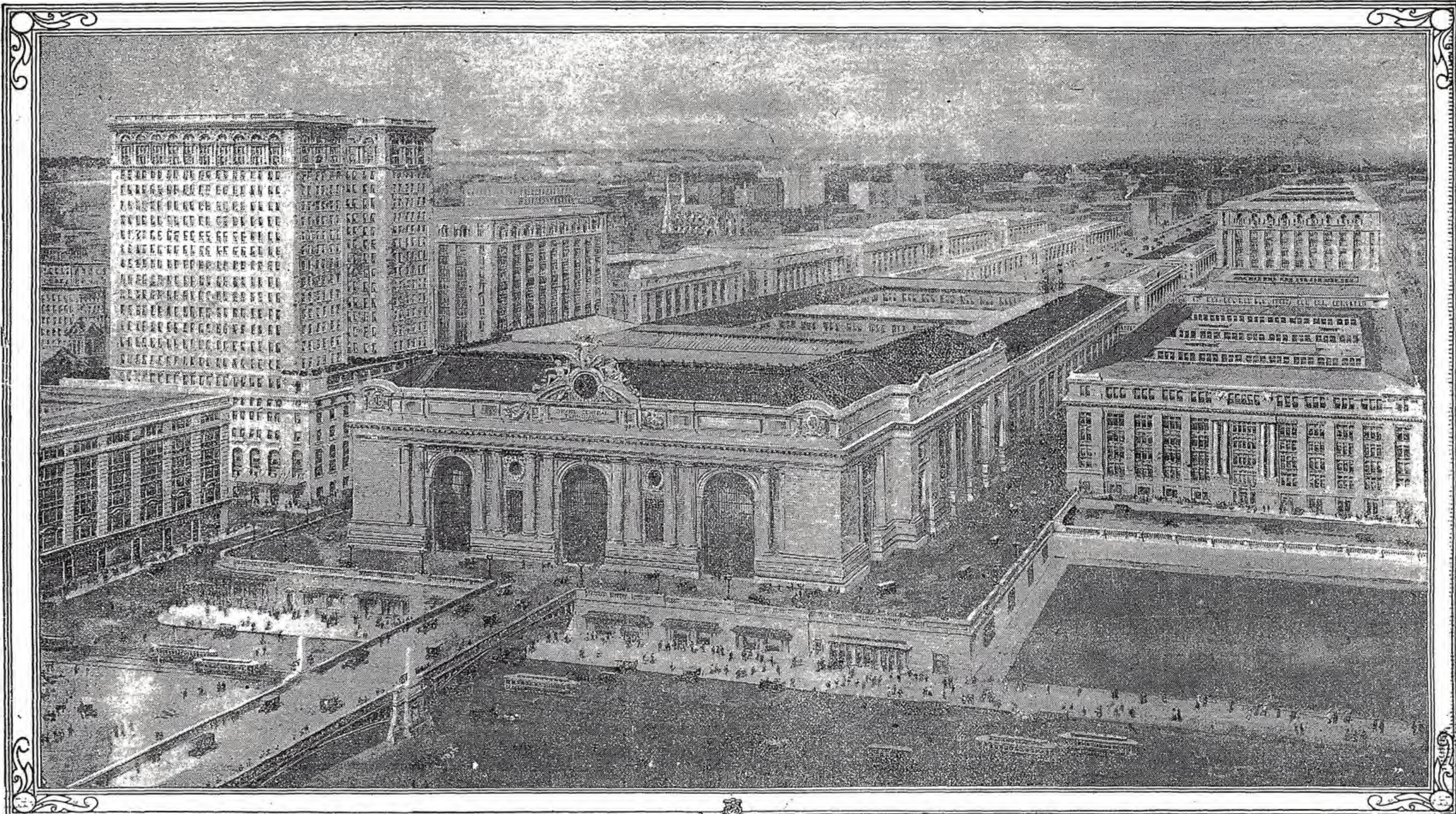


SUNDAY, FEBRUARY 2, 1913.

NEW GRAND CENTRAL TERMINAL OPENS ITS DOORS



With the Surrounding Buildings It Covers an Area of Thirty City Blocks — Can Accommodate 100,000,000 People a Year.

THE new Grand Central Terminal was thrown wide to the public at midnight last night. Out of the excavation and the scaffolding, to the accompaniment of whistles and blasting and the chorus of the riveting machine, the new station has risen amid the wreckage of the old. Already the suburban concourse has been in use for several months, the finishing touches have been made on the rest of the structure and, beginning to-day, the newest gateway to New York will be ready for the traveling public. Through that gateway in the coming twelvemonth close to 24,000,000 persons will pass on their way to and from the biggest city in the Western World. The schedule called for the dispatching of the first trainload of them at 12:25 this morning.

Many of the hurrying thousands who will pass through on this first day will see only the beauty and convenience of the world's newest railway terminal. But to those who will have heard or read of the plans, the fact about the new terminal that will seem most outstanding and most significant is that the new Grand Central is more than a gateway, more than a terminal. The terminal proper, the great head house and its accompanying buildings, are simply the heart and the cause of a group of buildings that has been described as a "terminal city."

The old Grand Central was considered the marvel of its day, but when it became outgrown and the Directors of the New York Central and the New York, New Haven and Hartford began to consider the ways and means for building its successor they undertook a task larger than the mere replacing of the old station by a newer and larger one. They undertook to fashion anew that entire section of the city where the old station stood, to build or cause to be built thirty blocks of buildings in Manhattan, all guided by one hand that would supervise their purposes and direct the general harmony of architecture.

This was made possible by the realization that the railroad could put its "air rights" to some good purpose. For decades it had owned the land where the tracks thrust their way down to the very heart of the island and there spread out to form the huge, gaping, dirty, unsightly train-yards that helped so largely to make the idea of smoke and noise inseparable from the nineteenth century conception of a big railway station. With the coming of the electric motor the old steam loco-

motive was banished, and from that banishment the builders of the new terminal developed the idea of roofing over the tracks and the trains and building above them as though the road had suddenly come into possession of scores of vacant lots.

This possibility, this idea, was fraught with tremendous importance to the City of New York. Its development meant reclamation work in the busiest and most compressed part of the continent commensurate with the reclamation work carried on in the great arid stretches of the Far West. It meant the restoration to the city of streets that for years had been given over to the purposes of the railroad. Park Avenue from Forty-fifth Street to Fifty-sixth and the cross streets that formerly stopped abruptly at either side of the yawning train yards are now appearing as streets, some of them already in use.

The two levels of tracks reaching from the outskirts of the city to Forty-second Street have been depressed below the surface of the streets, great girders have been swung across to support the restored thoroughfares, and over all the buildings of the terminal city are rising one by one, a real estate development of monumental proportions. It was started ten years ago. It will not be completed for many years to come. The opening of the terminal proper simply means the opening of the most significant structure of all, the key-note building of the group. All this terminal city, this assemblage of buildings of such varied purposes, was made possible by the installation of the electric motor. The scheme could not have been carried out—it could not even have been conceived—in the day of the dirt and smoke and noise of the old steam locomotive. The rock-bottom fact of the entire enterprise is the electric motor, powerful, swift, silent and clean.

Reclamation of Millions.
This reclamation work by the New York Central is reclamation work in one of the costliest stretches of ground on the continent. Its end is the recovery of city blocks where the very land of every block is worth between \$2,000,000 and \$3,000,000. It is restoration of land in a part of America where, according to estimates which experts have made, the very area taken up by one of the road's Pullman cars is worth \$30,000. It means the recovery and use of a great stretch of land that would cost an almost inconceivable fortune to buy.

The entire scheme involves the use of

some thirty city blocks. Part of this the railroad already owned. Part of it had to be specially bought, but the idea of using the air rights reduced by an immense sum the cost of the terminal. From a business standpoint, it was just as though the space to be excavated for the tracks of the terminal were in a part of the country where land cost little or nothing instead of in one of the busiest and most intense parts of Manhattan.

It is probable that no Director of the New York Central can tell you just how much the entire terminal city will have cost when the last stone is put in place. Certainly no Director of the road is likely to tell you. But it is equally certain that the improvements will be possessed of an immense earning power that will go far toward making an adequate return on the entire investment. One of the most important and most interesting chapters in the world's history of railroading will be written when practice shows to just what extent the development of the air rights will serve to meet the overhead charges of the terminal and when it can be definitely stated to just what extent a big terminal in a big city can of itself be made a source of revenue instead of a tax upon the traffic.

As it is, the new Grand Central is just the center of a group of buildings, some finished, some in the course of construction, some thoroughly planned, and some only dreamed of—buildings which will give over their basements to the going and coming of hundreds of trains a day.

Fourth Floor "Basements."

It is one of the most striking things about the terminal city that it will be an array of buildings without any basements—that are really at the base of the buildings. In the buildings already completed, the Grand Central Palace, for instance, or the huge office building that accommodates the executive business of the road and the terminal, the "basements" are on the fourth floor. They call these quarters "basements" because they are dedicated to purposes usually fulfilled by basements. They have storage rooms, and they accommodate the big pipes from which radiate the myriad pipes to heat the rooms.

For all the buildings of the Grand Central group will be heated from one power and heating plant, the one already erected at Fifty-fifth Street, between Park and Lexington Avenues.

Having no basements of their own, the buildings of the group, both present and prospective, will have to depend on the machinery housed at Fifty-fifth Street. This already sends the hot water down to the head house, to the general office, the Post Office, and so on, and some of it travels more than a mile before it returns to the heating plant at Fifty-fifth Street.

From the roof of that plant two huge smokestacks rise to a towering height. These smokestacks are interesting, for they are the only ones in the whole thirty blocks. And when the thirty blocks have all been "improved" they will remain the solitary smokestacks of that part of New York. Even they are equipped with the latest word in smoke consumers, so that, even when it is a completed and thriving area, the terminal city will be smokeless. That is one element in the promised beauty.

Park Avenue, restored from Forty-fifth Street north as a great double thoroughfare, is another, and, for the buildings themselves, it is simply promised that in cornice lines and general style they will be made to conform to the one stately architectural plan. Harmony, then, is another element in the promised beauty of the terminal city.

Of the thirty blocks, some fourteen are already built on or definitely allotted. The remaining sixteen are yet to be allotted. The terminal itself, with the offices over the baggage quarters, the extra office building, the Grand Central Palace, with its auditorium, the power and heating plant, the Adams Express Building and the Post Office are completed. The Biltmore Hotel and the incoming station, another hotel, and a Y. M. C. A. are definitely decided upon. It is highly probable that the new homes of the Yale Club and the Racquet Club will be placed within the terminal group.

Some Dreams Realized.

There are other building enterprises that have been spoken of, but which to-day are little more than dreams, dreams that the architects dreamed when they found themselves facing an opportunity so unusual in the history of city building. They found themselves working with big spaces in the heart of a metropolis. They realized that only within the area of the terminal city could a space of 400 feet by 400 feet of commercial ground easily be put to the use of some big artistic enterprise. Only in the jeal-

ously guarded parks of Manhattan could the National Academy of Design find another spot so suited to its purpose or the Directors of the Metropolitan Opera House find space at once so ample and so accessible for a new home. The possibility was immediately presented then, of having Park Avenue open into a great plaza with a stately new opera house set in the center, rivaling the beauty of the Place de l'Opera in Paris. The idea of placing the Metropolitan in the terminal group is an architect's dream. At present it is nothing more. So there has been talk of placing the National Academy there and other similar buildings, but they are dreams only. The future may see them there, and it may not.

But the Biltmore Hotel is far more than a dream. It is a definitely planned hotel that will tower twenty-three stories into the air, just to the west of the terminal. In some ways the Biltmore will be just a little different from any other in the long list of New York hostleries. It will owe its distinction to its being part and parcel of the terminal itself, for the Biltmore is to rise above the incoming station. It will open into that yet unbuilt part of the Grand Central.

The passenger arriving at the terminal from somewhere beyond the limits of New York will be able to walk directly to the elevators that will lift him to the lobby of the Biltmore. He will be able to go directly from his seat in the Pullman to his room in the hotel, not only without having stepped from under cover, but without once having passed beyond what will really be one structure.

This notion of a hotel built in connection with a terminal provides endless diversion for the idle fancy. It has already been pointed out that when the Biltmore is a thing accomplished, your business man from Chicago will be able to come to New York, stop here over night, attend to his business down in Wall Street, and return to State Street and Michigan Avenue without once having come out into the open. This will be the easiest thing in the world when he can go directly from the train to his rooms—his baggage may get there ahead of him and without having been rechecked at that—dine in the big dining hall, revel in a Turkish bath and spacious plunge there that night, travel on down to one of those big office buildings that have Subway connections in their basements, wind up his business, and re-

turn by the Subway to his hotel, to his train, and to Chicago without ever having put his head out of doors in New York. Incidentally he will be able to do any little shopping that is on his mind, for there will be a lot of specialty shops beneath the Biltmore. The aforesaid twenty-three stories reach into the air. There are five other stories that plunge into the ground.

Another feature of the Biltmore that will serve to distinguish it somewhat from many of its competitors on this island will be its roof. The grand ballroom and dining hall of the Biltmore is to be on the twenty-third floor. It is to be so built that when the warm evenings come the windows can be taken out and the whole area converted into a roof garden of roof gardens. From a table there, mild and his lady can look out to the dark stretch of Central Park to the north, and to the south the Metropolitan tower and far away the tip of the Woolworth Building; to the west the Times Building, and beyond the Hudson and the Jersey shore, and to the east the East River and Long Island.

Gustav Baumann, long identified with the Holland House, is to preside over the destinies of the Biltmore. It is to be a hostelry of the "de luxe" sort, and the Directors of the road hope to see it regarded as one of the finest hotels in all the world.

Big Popular Hotel Also.

A hotel of another type, a thoroughly modern commercial hotel with rooms numbering possibly up to 2,000 and any of them to be had on moderate terms, is planned for another part of the terminal group. It is probable that this will be built directly to the east of the headhouse at Forty-second Street and Lexington Avenue, where the hospital stands now. The only reason why the plans are not more definite is because the subway plans have not been more definite. When it is finally established just where the line of the Lexington Avenue Subway is to be, then the work of building the big commercial hotel will be started.

These, at least, are some of the buildings which will go to make up the terminal city of which the new Grand Central itself is now to be a thing of daily use to thousands of persons. Some notion of the magnitude of the new Grand Central may be gathered from a comparison of its proportions with those of some of the world's great railway stations. These figures are The Scientific American's:

	Total Area, Acres.	Track Length, Miles.	No. of Platforms.	No. of Tracks.
New Grand Central Terminal	70.0	31.8	46	80
Pennsylvania Station	25.0	10.0	21	11
Chicago & North Western, Chicago	5.0	2.7	16	8
St. Louis Union Station	10.0	8.4	33	10
Boston, South Station	0.5	18.0	33	10
Washington, Union Station	12.0	24.2	29	13

Colombia	5.8	8.4	13	6
London, Waterloo Station	8.73	19	19	19
Druidston, Main Stn.	7.0	3.0	14	6
Paris, La Gare	11.2	3.5	31	10
Frankfurt, Main Stn.	11.0	18	18	18

The number of tracks in the new terminal is here given as 46. There are really 68, but only the 46 have platforms.

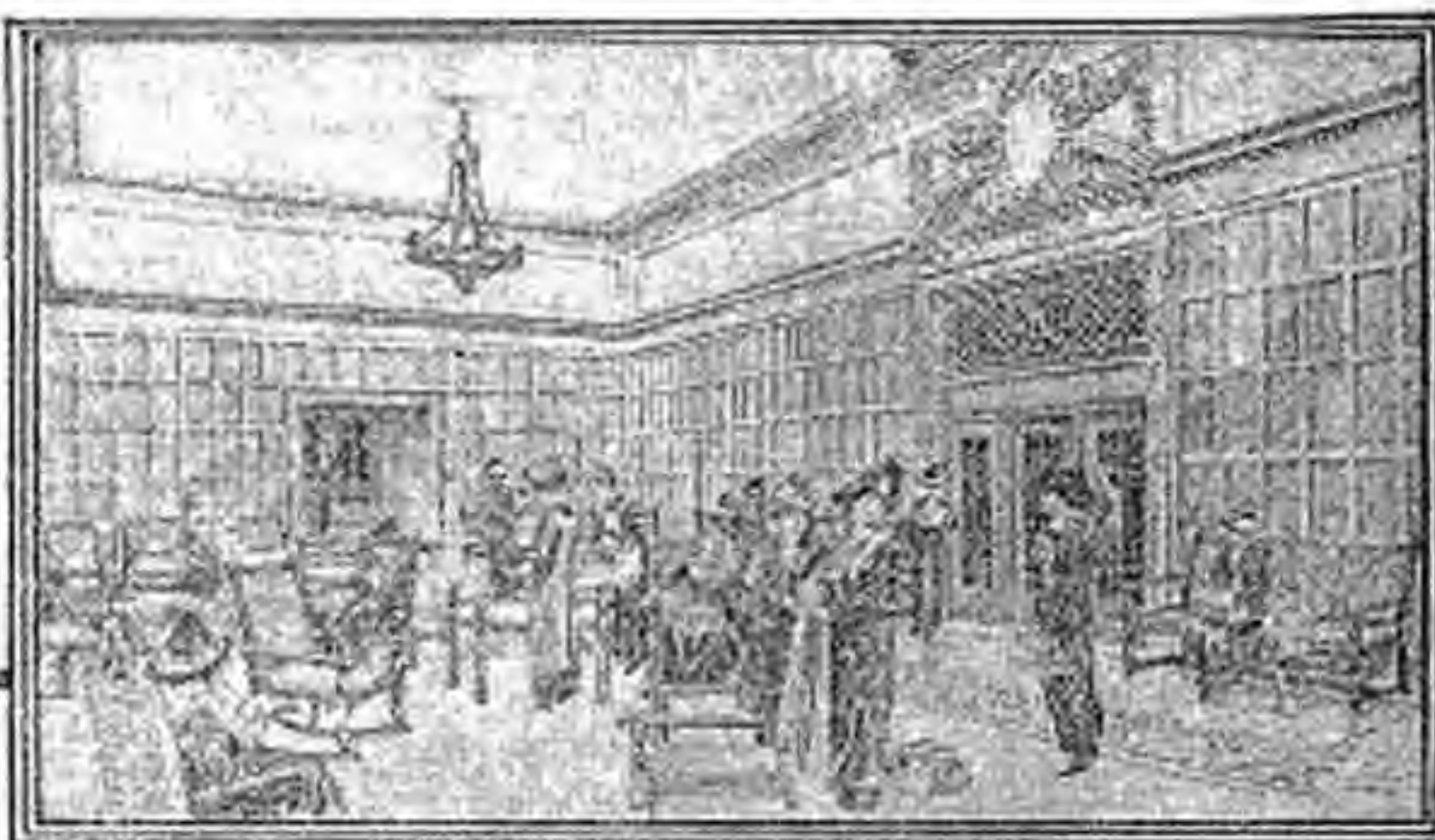
One of the things that will always be remembered about the new Grand Central is that it was built amid the wreckage of the old. The never-ending business of the terminal had to go on uninterrupted. The very depression of the tracks beneath the level of the city streets involved a huge amount of labor. It meant the excavation of 2,500,000 cubic yards, about 2,000,000 of them solid rock. The earth and stone dug and blasted there in the train yards had to be carted away in dirt cars, which added a long string to the already heavy and complicated traffic of the terminal. This work is not yet done.

So in the wrecking of the station itself the work had to proceed while hundreds of thousands passed to and from the trains every week. This involved an immense amount of temporary building, temporary train sheds, temporary walkways, temporary tracks. This extra cost alone was in the neighborhood of \$2,000,000.

Besides being costly, it was extremely difficult and intricate work. The builders of the new station sat behind the big work as at some chessboard where buildings were castles and pawns were trains. Now shifting here and substituting there, now tearing down, now building up, the magnificent debris of its predecessor, and grown without seriously interfering with the traveling public.

Just what this meant could be seen when the New York Central announced with no small pride that during the eight days from Aug. 30 to Sept. 6, 1912, the number of persons passing through the terminal was 44,000. This was the Labor Day traffic. There were 4,828 trains handled during this same period, with an average delay of but twenty-one seconds a train, which is pretty nearly perfect operation. The removal of the old train shed alone was one of the most difficult and daring things in the history of building. It was 600 feet long and had a 200-foot span, a huge thing of steel and iron and brick and glass. It was torn down, but the traffic beneath was not halted for so much as an hour. In the busy hours of the day an enormous moving traveler, sliding along, built on high platforms, attended to the work of demolishing the old shed, section by section. In the slack hours of the night the debris was lowered to the worktrains and hauled off of sight and out of mind. Some notion of the scope of this single task may be gathered from the fact that it meant the removal of 1,350 tons of wrought iron, 350 tons of cast iron, 90,000 square feet of corrugated iron, and 60,000 square feet of steel. The traffic was not only not halted during all this wrecking, but not an accident occurred to mar the story of it. Altogether the building of the new Grand Central Terminal was no easy task.

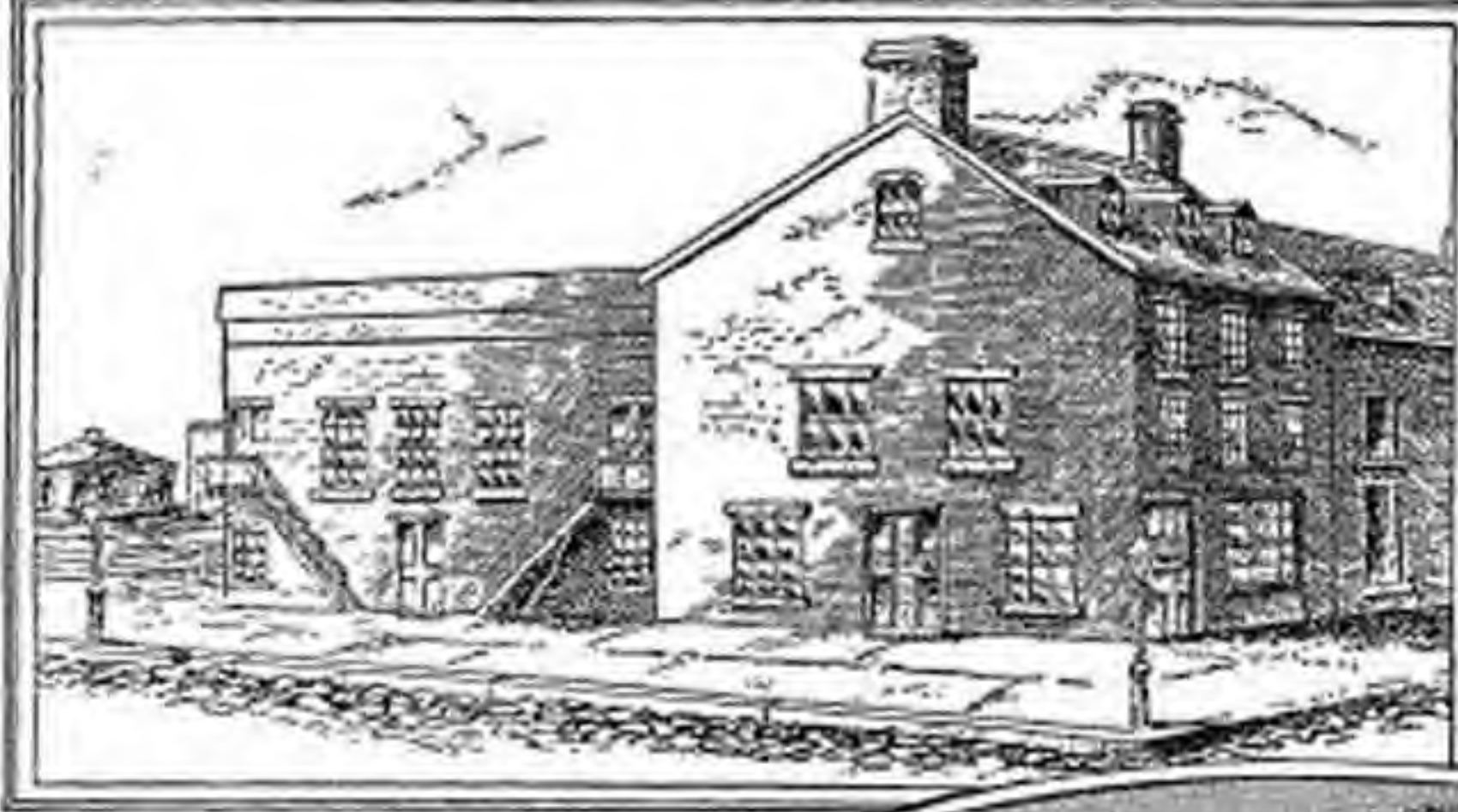
Looking Ahead to Possible Traffic Development, the New Structure Has a Passenger Capacity Equal to Any Conceivable Emergency.



LADIES WAITING ROOM

From this the ascent to the street will of course be easy, and it is the street which forms the sixth level from the bottom of the series. A seventh will be supplied by the bridge to be thrown across Forty-second Street from the new Grand Central, in order to provide easy and safe communication with the summit of Murray Hill in Park Avenue.

CITY'S GROWTH EPITOMIZED IN TERMINAL CHANGES



Old Office on Tyron Row—Fourth Avenue Railway.

PERHAPS nothing gives so clear a bird's-eye view of the tremendous growth of this city as does a glance backward over the eighty-one years that cover the history of the New York Central on Manhattan Island.

Here is just one quick glimpse that vividly shows the almost magical growth of the city's population and of its ever-increasing demand for greater transportation facilities:

In the late fifties, when the tide of population and traffic moved uptown, a new station was built at Twenty-sixth Street, on the present site of the Madison Square Garden. It was erected by the New York & Harlem Railroad, now a leased line of the New York Central, and shared by the New Haven Road as a tenant. This structure was one of the sights of old New York; the city was justly proud of its spacious new terminal. Yet that station of fifty years ago could be set down in the express concourse of the new terminal in Forty-second Street without touching the side walls or reaching the roof.

But let us start at the beginning. The New York & Harlem Railroad was the earliest on Manhattan Island. It was built in 1832, and its terminal was on Centre Street, just back of the City Hall. At that time, however, the terminal was no more than the mere ending of the tracks, just as certain of the surface cars end their runs there to-day.

This railroad was partially operated through two tunnels. The first of these cut through the crest of Murray Hill from Thirty-fourth to Forty-first Street. The second was the so-called "rock tunnel," extending from Eighty-sixth Street to about 100th Street. From it the railroad descended over a timber trestle—about which timid folks were always nervous—to the Harlem plain.

It was soon decided that a station was a proper part of a terminal's equipment, and so a little later we find the New York & Harlem Railroad building a station at White and Centre Streets, the present site of the Criminal Court Building.

The city north of the new station soon began to solidify, the streets became filled with traffic, and the increasing number of passengers necessitated longer trains. When the trains grew to the unprecedented length of five cars, only the first three cars rounded the sharp curve at Broome Street and continued on to White Street. The other two were cut off where the rails left the Bowery.

This expedient met conditions for a very short time. The city continued to grow, the Bowery began to be a real city street, and the people objected to locomotives running on it.

To meet this difficulty the management planned New York's first "uptown" railroad terminal. In 1837 the New York & Harlem Railroad station was completed at Fourth Avenue and Twenty-sixth Street, where the Madison Square Garden now stands, then the "outskirts" of the Nation's metropolis.

Yes, New York was growing, and undoubtedly it would continue to grow. The new station at Twenty-sixth Street was constructed with an eye on the future growth of the city.

It was used by the New York & Harlem Railroad and the newer railroad to New Haven, which used the former's tracks south of Woodlawn. Harlem trains swung out from one side of the station, New Haven trains from the other.

Its capacity caused New Yorkers to swell out with a vast amount of civic pride. They told out-of-town people, with much satisfaction, that 8,000 persons came in and went out by way of it every day. There were thirty trains each way a day.

A copy of an old time table on the Harlem Road is given on this page. After the completion of this great terminal no locomotives were sent south of Twenty-sixth Street. Horses were used to draw the cars through the pleasant suburban streets to the heart of the city. A few stops were made at the busiest cross streets, such as Twenty-third Street, Fourteenth Street, and Canal Street.

Soon there was more trouble for the railroad: people began to object to the locomotives running through Fourth Avenue to Twenty-sixth Street, though the tracks lay through the Fourth Avenue tunnel from Forty-first Street to Thirty-fourth Street, now used by the trolley cars. The agitation became so strong that the railroad had to buy a big open lot at Forty-second Street for its engine houses and send the cars south from that point drawn by horses.

It was a few years after this that Commodore Vanderbilt began to play his part in the railroad affairs of the Nation. But before this is recounted let us glance at New York as it was

In Eighty-One Years of Its History the Central Has Built Five Stations in Its Efforts to Supply New York's Evergrowing Population With Adequate Transit Facilities.



Pulling Cars from Twenty-sixth Street and Madison Avenue to Terminal Near City Hall.

hung in front of each one. Now and then the men in charge of the horses would give them a nibble to keep up their spirits.

One day the Commodore stopped in at his fuel mill. The hay device interested him immensely. As he turned to leave he said to one of the men in charge:

"You'll have to see that you don't run out of hay here. If you should any railroad would go out of business!"

The completion of the Grand Central Depot, however, brought no rest for the railroad management. Within a month after it was finished there was a great public clamor.

Several cross streets passed over its approach yards at level; in fact, there were grade crossings all the way north in Fourth Avenue to Eighty-sixth Street.

The horse cars in Fifty-ninth Street used to have constant half breadth escapes at the Fourth Avenue crossing, and that was nothing to the crossing at Forty-fifth Street, at the mouth of the trainshed. A driver who took his wagon across those fifteen busy tracks literally took his life in his hands. It was a trip of daring for foot passengers. Beyond the wooden trestle leading down to the Harlem plain there were also many grade crossings before the drawbridge at the Harlem River was reached.

The deaths at the many grade crossings were so frequent that an agitation against the road was started which was even greater than the recent agitation against "Death Avenue," on the west side.

Mass meetings were held over Harlem, Yorkville, and in the district between Forty-second and Sixty-third Streets, and the watchword was, "Sink the track and arch it over." Well-known speakers appeared at the meetings, and the agitation grew so rapidly that the whole city was up in arms.

The railroad was finally compelled to take action, but succeeded in having the city pay one-half of the expense, at which there was little complaint, so anxious were the citizens for the improvement.

By the beginning of the eighties the terminal was again in a state of congestion. The suburban business had become a sizable traffic. The station was clogged morning and night, and so the annex, which gave four additional tracks to it and provided for most of the incoming traffic, was built in 1884.

But it was not many years before complaints began to be heard again, complaints against the old waiting rooms and the general facilities for handling passengers.

As a result of these complaints, in 1900 the station was enlarged to accommodate about 60,000 passengers daily. The number of tracks was increased and three stories were added to the building. These changes cost over \$2,500,000.

Yet these facilities, imposing as they seemed at the start, soon proved inadequate. There were many reasons. One was, of course, the rapid increase of population in New York and vicinity. Another, and perhaps the most important, was the immense growth of the suburban traffic. More than a million commuters came into New York every morning from points within a radius of twenty-five miles, and a considerable part of this human stream pours through the Grand Central. It must be handled quickly and without interference with the through business. The recent work really began with a study of possible improvements in managing this near-by traffic.

To the congestion of traffic was added discomfort from the use of steam engines. This was especially obnoxious and dangerous in the tunnel. Sentiment developed for the electrification of the roads using the station. In January, 1902, conditions were crystallized by an accident which occurred in the tunnel on a snowy morning, owing to the inability of a train engineer to see signals on account of the smoke from a locomotive ahead. As a result a legislative act was passed at Albany requiring the railroads, after a certain date, to operate their trains by electricity through Park Avenue.

Now that electrification was mandatory, fresh impetus was given to the plan of reconstructing the terminal. Here we reach the real keynote of the whole great project, for without electrically hauled trains the improvement could not have been developed along the broad and original lines that mark it. Now that the great terminal has been opened, people are beginning to speculate on how long the new one will last. "No one can tell," said an old railroad man. "I hope it will last at least half a century."



Terminal at Fourth Avenue and Twenty-sixth Street, Built in 1837.

in the middle of the last century.

On the east side of the city, Yorkville and Harlem were villages clustered about Eighty-sixth Street and 125th Street, the former being reached by the Third Avenue surface railway, and the latter by the same road, and the line of boats which started from Peck's Slip. The Harlem Railroad also stopped at Eighty-sixth Street, 110th Street, and 125th Street.

The west side of the city was practically unsettled. Above Fifty-ninth Street, west of Central Park, there was only one row of stone houses—on Ninety-second Street, east of Columbus Avenue—and the Boulevard stages and the Eighth Avenue surface cars took care of all the traffic between Broadway and Central Park, and the Hudson River Railroad, with its stations along the river front at Manhattanville, Carmanville, Inwood, and Fort Washington, took care of the rest of the inhabitants of that section.

The Hudson River Railroad was an independent line at that time that clung closely to the west side of the town. When it was first put in operation—not so many years before the time of which we are speaking—the cars were sent out from a little covered shed at the southwest corner of Chambers Street and West Broadway. Then folks began to object to the locomotives going through the streets, and cars were drawn by horses to the yard at Thirtieth Street, where they were made into trains and the road engines attached. This was found to be unsatisfactory. Before the close of the civil war all passenger trains were being received and sent from Thirtieth Street. It is interesting to note here that it was at this station that Abraham Lincoln was received when passing through New York on his way to Washington for the inauguration in 1861.

And now to come to Commodore Vanderbilt. Late in the year 1862 this great railroad organizer set about buying the stock of the New York & Harlem Railroad. He is said to have bought much of it at \$9 a share. In less than a year the stock was being quoted at \$50 a share.

What had caused this big jump? Rumors were in the air, and within less than a twelvemonth they were

justified. By 1864 Vanderbilt looked up as the owner of a controlling amount of stock in the New York & Hudson River Railroad.

With these two railroads in his control, Vanderbilt began the process of "assimilating" a third—the New York Central. This was a union of ten little railroads, some running in the territory between Albany and Buffalo, others merely projected.

With these three railroads under one control all that was needed was a short line from the Harlem tracks across to the disreputable ferry ride there; and the great through trunk line between New York and Buffalo was established, and took the name of the absorbed up-State road—the New York Central.

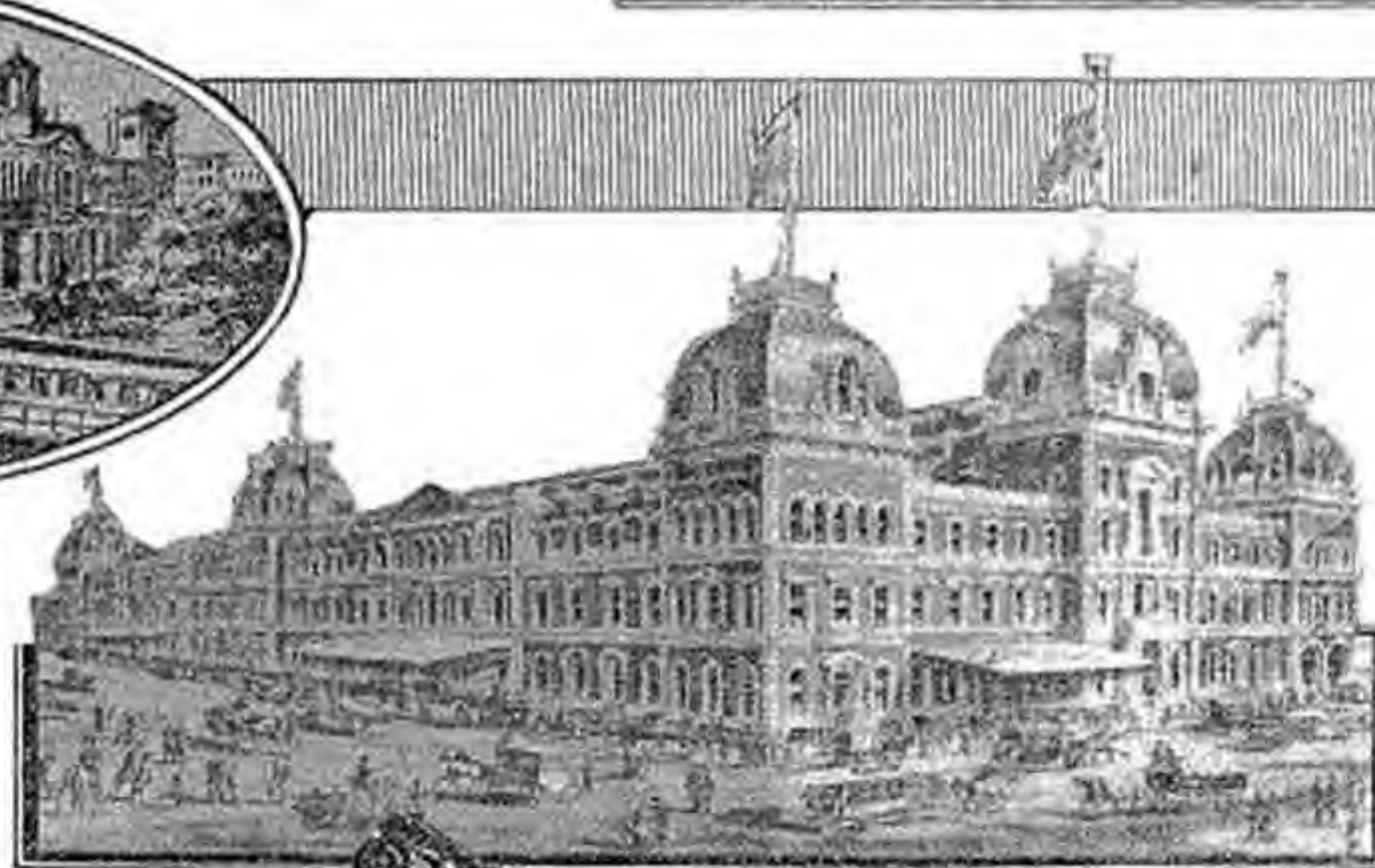
Such railroading demanded a real gateway in New York. In 1860 the plans for a new station, the terminal of the newly amalgamated lines, were completed.

There had been a great deal of discussion over the site. Commodore Vanderbilt settled the question by selecting a piece of ground on Forty-second Street. He called the new station the Grand Central because of its accessibility.

Its cornerstone was laid on Sept. 13, 1868. As the station began to take shape, New York opened its eyes and gasped. Nothing like it had ever before been seen. It had fifteen tracks in its trainshed. Some folks said that Commodore Vanderbilt was in his dotage. Others explained the great depot by saying that the Commodore was simply building a terminal that would last for all time.

The first train left the trainshed on Oct. 7, 1871. According to contemporary notices this wonderful shed covered four acres of land, had two acres of offices under its roof, and required fifteen miles of steam piping to heat them. It conveniently accommodated a daily traffic of eighty-eight trains, three of them through expresses to the West. During its opening year 4,000,000 people passed through its doors.

A picturesque annex of the original Grand Central was the Commodore's fuel factory. It was next to a stable that stood where the Hotel Belmont now towers, and consisted of a treadmill operated by horses. This mill cut the wood used in the New York Central's locomotives. To keep the horses at their drudgery a wisp of hay was



The Predecessor of the Present New Terminal.

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The Predecessor of the Present New Terminal.

MODERN TERMINAL SUPPLIES PATRONS WITH HOME COMFORTS

STATION.—A place where railroad trains regularly come to a stop for the convenience of passengers. Thus says the dictionary, and for its day and generation it spoke the exact truth that is expected of a good dictionary.

But now that the new Grand Central Terminal has been opened to the public an enlarged definition of the word "station" is needed.

The mammoth structure, facing Forty-second Street, might accurately be described as a great railroad terminal with home trimmings attached. The management has not only planned a station in which hundreds of trains daily can arrive and depart promptly, a station in which thousands and thousands of passengers can get to and from their trains with the least trouble and inconvenience, but it has planned a station in which these passengers can find, if they so wish, many of the conveniences of their more or less far-away homes.

Said an official of the railroad: Let us begin in the women's boot-black room. Women travelers at Grand Central Terminal may step into a handsome, brightly lighted room entirely out of sight of the rubber-necks, where colored girls in neat blue liveries will polish their shoes. Or if hair gets out of curl in a damp day's journey the woman passenger may go to the women's hair-dressing parlor in Grand Central Terminal, a magnificent apartment with walls and ceilings of Carrara glass, where none but her own sex will see while she has her hair dressed in the very latest style. Next she may step into an equally sumptuous manicure parlor, or if she is in a hurry, the manicure will attend her while the hairdresser works.

should want to return after a shopping tour to change her costume for a social function, she may have her suitcase or her trunk, for that matter, sent to a private dressing room, for the use of which, with a maid in attendance, she will pay but 25 cents.

Probably no woman ever started on a journey without forgetting something. These little oversights need cause no worry to the traveler in the Grand Central Terminal. The little knickknacks she may need to complete her toilet are to be found right at hand, almost at the door of her dressing room at the same prices she pays in her favorite store, or if the hairdresser does not happen to have what she wants she has but to stop across the main waiting room or send a messenger to a hall, from which opens a row of shops right in the terminal itself, where complete lines of everything that travelers can be expected to want are on sale.

After all these exertions the traveler will probably feel hungry. Only a few steps away from her dressing room is a handsomely appointed restaurant. When she is finally ready to go the traveler may step into a taxicab, with prices under railroad regulation, that will take her anywhere in short order, or if she wants a cheaper ride she may, without once stepping into the open, descend to a subway line that will take her to any part of New York, to New Jersey, or to Long Island.

The only place on earth outside his own home that a man may have a private barber shop for his own exclusive use, with a barber in attendance at his pleasure, is at Grand Central Terminal. Many men, particularly those occupied with large affairs, like to get away from the crowd whenever possible. For this purpose they travel in private cars or in compartments or drawing rooms in sleeping cars. Now, for the first time they can have a private barber shop reserved by wire for their use upon arriving in New York at any hour of the day or night. The cost of this

luxury, including the services of a barber, is \$1 an hour.

Those who want a shave in luxury at lower cost may patronize the \$100,000 public barber shop, with its walls and ceilings of Carrara glass. Here the customer may elect to be shaved in any one of thirty languages. Since travelers from all the nations of the earth pass through Grand Central

terminal, the management has provided the most extraordinary array of linguistic talent ever assembled in one business in order that no traveler may need to resort to the sign language to explain how he wants his hair cut. Being under railroad regulation, the prices are only three-fourths the rates at pretentious shops elsewhere in the city.

The man with two days' business or pleasure to crowd into one can reserve a dressing room at the barber shop, leave his suitcase there all day, rush back at 6 o'clock to get into

evening clothes, with the aid of a valet if he wishes, all for 25 cents. A haberdashery adjoining the barber shop is ready to replace a lost collar button or supply anything else needed. Here, at least, men are accorded equal rights with women.

Should sudden illness seize the traveler in the Grand Central Terminal a physician from the emergency hospital, right in the building, will be at his side within a couple of minutes. If necessary the sufferer will be tucked in bed in the hospital within another couple of minutes.

THE HANDLING THE BAGGAGE

THE handling of baggage is one of the greatest problems of the big railway terminal—a problem the burden of which is felt both by transportation company and passenger.

In the model station just opened a new and satisfactory solution has been worked out for this old and vexatious puzzle. The passenger will no longer need to hunt out a more or less remote baggage room. Under the new Grand Central system he won't need to go to the baggage room at all; he will check his baggage with the same convenience and dispatch with which he buys his railroad ticket.

On the east side of the concourses are baggage-checking counters. A passenger entering either of these concourses will find nearest at hand a row of ticket windows. His transportation purchased at one of them, he passes along to another row of windows where, if he so desires, he can secure his Pullman seat, berth or section. Continuing on his way, he comes to the baggage-checking counter. If he has hand luggage with him that he wishes to check, he goes to one section of the counter which is especially set apart for this purpose. His transportation shown, he receives a check; a

duplicate is put on his valise, and the valise is then placed on an automatic carriage which bears it immediately to the baggage room, which is back of the main terminal building.

Rather than follow this valise in its trip to the proper train, let us see what happens when a man checks a trunk or other piece of luggage that has been delivered or is to be delivered at the station by express wagon. For once it is in the baggage room and properly checked all luggage is handled according to the same routine.

The passenger shows his transportation and his transfer or express company check to one of the men at the baggage-checking counter. A railroad baggage check is handed to the passenger, who can thereupon go his way free from further baggage cares. The man behind the counter fastens a duplicate of the railroad check that he has already given to the passenger to the passenger's transfer or express company check, and both are dropped into a pneumatic tube and shot to the baggage room.

STATIONS.	Min. Train	De. Park	De. Park	De. Park	De. Park
27th Street	8.45	8.50	9.00	9.05	9.05
Yorkville	8.50	8.55	9.05	9.10	9.10
Harlem	8.55	9.00	9.10	9.15	9.15
West Haven	9.00	9.05	9.15	9.20	9.20
Brooklyn	9.05	9.10	9.20	9.25	9.25
Williams Bridge	9.10	9.15	9.25	9.30	9.30
East 10th St.	9.15	9.20	9.30	9.35	9.35
East 11th St.	9.20	9.25	9.35	9.40	9.40
East 12th St.	9.25	9.30	9.40	9.45	9.45
East 13th St.	9.30	9.35	9.45	9.50	9.50
East 14th St.	9.35	9.40	9.50	9.55	9.55
East 15th St.	9.40	9.45	9.55	10.00	10.00
East 16th St.	9.45	9.50	10.00	10.05	10.05
East 17th St.	9.50	9.55	10.05	10.10	10.10
East 18th St.	9.55	10.00	10.10	10.15	10.15
East 19th St.	10.00	10.05	10.15	10.20	10.20
East 20th St.	10.05	10.10	10.20	10.25	10.25
East 21st St.	10.10	10.15	10.25	10.30	10.30
East 22nd St.	10.15	10.20	10.30	10.35	10.35
East 23rd St.	10.20	10.25	10.35	10.40	10.40
East 24th St.	10.25	10.30	10.40	10.45	10.45
East 25th St.	10.30	10.35	10.45	10.50	10.50
East 26th St.	10.35	10.40	10.50	10.55	10.55
East 27th St.	10.40	10.45	10.55	11.00	11.00
East 28th St.	10.45	10.50	11.00	11.05	11.05
East 29th St.	10.50	10.55	11.05	11.10	11.10
East 30th St.	10.55	11.00	11.10	11.15	11.15
East 31st St.	11.00	11.05	11.15	11.20	11.20
East 32nd St.	11.05	11.10	11.20	11.25	11.25
East 33rd St.	11.10	11.15	11.25	11.30	11.30
East 34th St.	11.15	11.20	11.30	11.35	11.35
East 35th St.	11.20	11.25	11.35	11.40	11.40
East 36th St.	11.25	11.30	11.40	11.45	11.45
East 37th St.	11.30	11.35	11.45	11.50	11.50
East 38th St.	11.35	11.40	11.50	11.55	11.55
East 39th St.	11.40	11.45	11.55	12.00	12.00
East 40th St.	11.45	11.50	12.00	12.05	12.05
East 41st St.	11.50	11.55	12.05	12.10	12.10
East 42nd St.	11.55	12.00	12.10	12.15	12.15
East 43rd St.	12.00	12.05	12.15	12.20	12.20
East 44th St.	12.05	12.10	12.20	12.25	12.25
East 45th St.	12.10	12.15	12.25	12.30	12.30
East 46th St.	12.15	12.20	12.30	12.35	12.35
East 47th St.	12.20	12.25	12.35	12.40	12.40
East 48th St.	12.25	12.30	12.40	12.45	12.45
East 49th St.	12.30	12.35	12.45	12.50	12.50
East 50th St.	12.35	12.40	12.50	12.55	12.55
East 51st St.	12.40	12.45	12.55	13.00	13.00
East 52nd St.	12.45	12.50	13.00	13.05	13.05
East 53rd St.	12.50	12.55	13.05	13.10	13.10

HOTEL KNICKERBOCKER

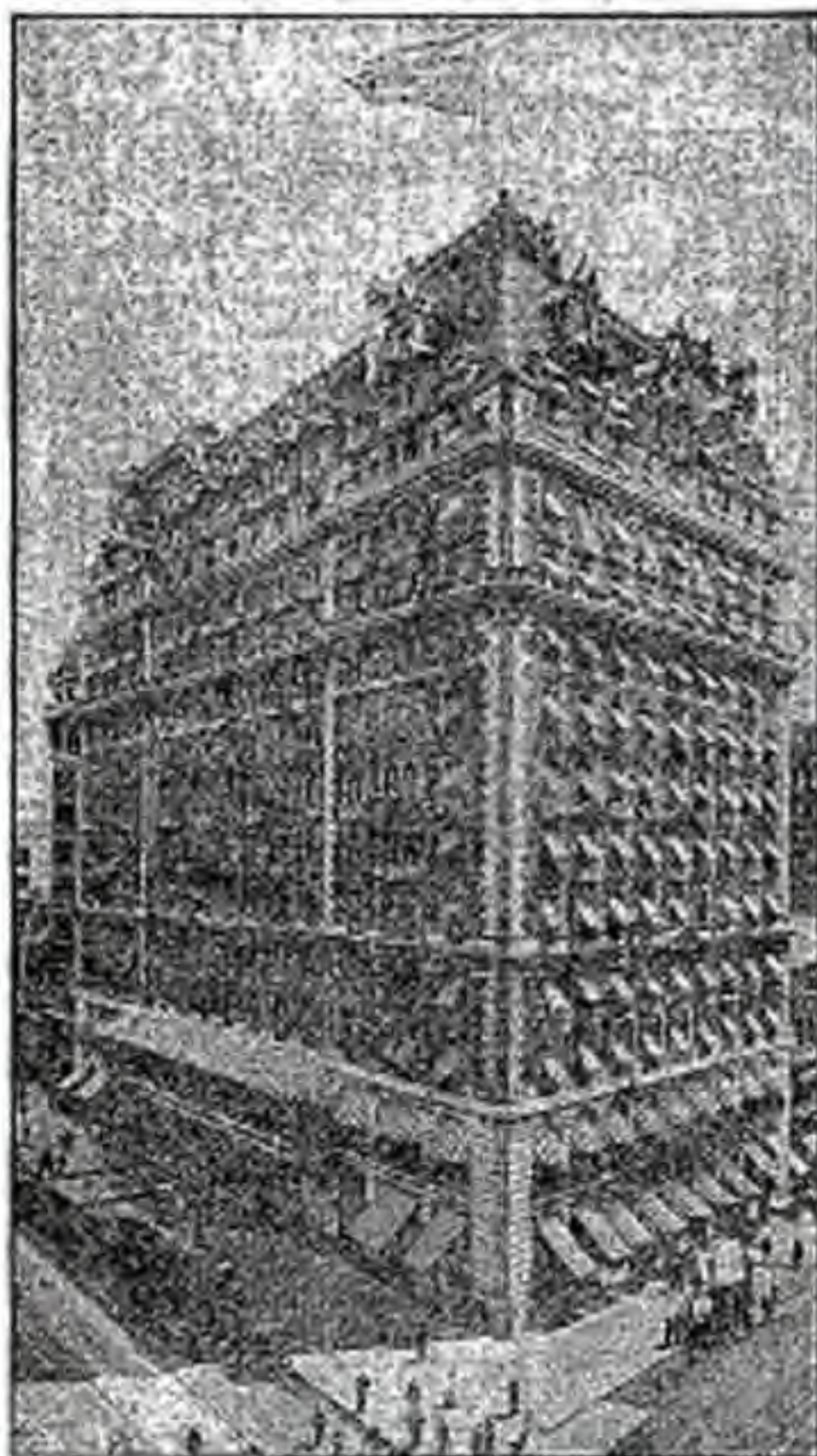
JAMES B. REGAN, Proprietor

42d Street at Broadway, New York City

Broadway—famous in song and story, pathway of men's feet from the days when it was an Indian trail until now, when gleaming lights and the wizardry of its world-wide fame make it dear to the New Yorker and a marvel to the visitor—Broadway—Why, its very quintessence lies in this great Hotel!

Forty-second St. and Broadway forms the true heart of New York, and this great pulsating thoroughfare, Broadway, most wonderful in the world, holds the Knickerbocker Hotel the centre of its dynamic energy, as it is the most magnificent specimen of architecture along its entire length.

Within, the Knickerbocker is worthy of the international fame it enjoys as the "Cosmopolitan centre of the world." Rare antique heraldic banners collected in Europe—the almost priceless heirlooms of noted European families—ornament the walls of rooms and corridors gleaming with classic Pavonazza marbles and with bronze. Superbly beautiful marbles, the work of America's greatest sculptor, Frederick MacMonnies, divide attention with tapestries rich and rare, while here and there throughout the vast building are hung the most charming examples of the work of Maxfield Parrish, Frederic Remington, James Wall Firm, and Saint-Gaudens's pupil, John Flanagan.



Six hundred sleeping rooms has the Knickerbocker. Fifteen stories of comfort and luxury, filled with all that can appeal to the artistic sense. No expense has been spared in making the Knickerbocker Hotel one of the most remarkable hotels in the world, and from the vast subterranean wine-cellar, stocked with rare and precious vintages, to the New Armentonville open-air restaurant (Mr. Regan's own and characteristically happy thought), all is the best that could be devised after careful comparison with the best that can be shown by the rest of the New and Old World. In another aspect—that of facilities—the Knickerbocker Hotel is unrivalled. It is equipped with the latest Marconi wireless apparatus, at the service of patrons. It is at the centre of converging lines of railroad and city traffic, and contains within a radius of 400 yards all New York's leading theatres, while the greatest stores of the Metropolis are within a few minutes' walk.

James B. Regan Importation Company, 140 West 42d Street, Times Square

Importers of Vintage Champagnes, English Cuvées, Russian Caviar, Chateau bottled Burgundies and Clarets, Vintage Cigars.

FIRST GREAT STAIRLESS RAILWAY TERMINAL IN HISTORY

Unique Architectural Feature by Which Passengers Reach Trains by Easy Grades.

THE New Grand Central Terminal, which threw wide its doors to the traveling public at midnight last night, has been hailed as a stairless terminal, the first of its kind in the history of terminal building the world over. The first passengers to rush through this new gateway to the St. Louis Express that was scheduled to pull out of the station at 12:25 this morning found not a single stair in their way. They could go from the point where the red cross-town car dropped them in Forty-second Street, straight to their waiting berth in the Pullman, one level below the street, without finding a single step to descend. It was their introduction to a stairless terminal.

The suburbanites have known about it for weeks. Ever since that part of the terminal was put into daily use in the late Fall, those bound for the nearby towns have been experiencing that inestimable boon to a hurrying public, the gently sloping footway, leading down by almost insensible degrees to the trains depressed two levels below the surface of the city.

When the builders of the new terminal discovered the possibilities of

rooting over the transverse to the end that revenue-producing structures might be reared above them, it was as good as settled that the station itself would be an underground station. When it was decided that the new terminal should be under ground, and not merely slightly depressed, but two deep levels beneath the street, there arose the great question of the most desirable means of communication between street and train. The engineers and architects turned the question over in their discussions, and in the end the solution was the ramp. Some of the passengers who have been using the gentle incline that leads to the already populous suburban concourse have been heard exclaiming over the novelty and ingenuity of this arrangement.

But the idea is not new. The Grand Central builders cannot claim it as their own, although they were the first to see its value for terminals on a large scale. The idea itself is centuries old. It was evolved when a not dissimilar problem confronted the builders of the camps for the old Roman armies, and those whose duty it was to haul the wagons and heavy artillery to ramparts of a Roman city. They built long runways. So did those who built the

pyramids. It is this ancient device of the long, gentle slope that has been incorporated as one of the most striking features of the latest word in railway stations.

These ramps are the gentlest of slopes. Those which lead down to the suburban concourse are, of course, steeper, but not so steep as to be unpleasant footways. Those leading to the express concourse are barely perceptible. The traveler moves from Forty-second Street to the limited train for Chicago without descending a step and without descending a slope so steep, for instance, as that Murray Hill grade leading south from Forty-second Street.

The old idea would have failed in execution if the ramps had been too steep for comfort. And in this case, it was not the comfort of the hale and hearty that was considered. The builders of the terminal decided that the ramps, if ramps there were to be, must slope

so gently from the street to train as to present not the slightest difficulty to the old, infirm traveler, to the little tot toddling along at his mother's side, to the man laden down with baggage which he declines to relinquish to any one of the most cordial attendants, to the woman trailing a long and preposterous train. The ramps must be convenient to these extreme types. They must suit the most halting gait or fail. It has been said of them that "the lame man decided."

So a deal of study was given over to the selection of just the right gradient. At almost every stage of the building of the terminal, the privileged spectator found the builders going to the most elaborate pains to insure perfection and efficiency. At no point was greater care taken than in this matter of the ramp. Every sort of ramp was tested, both as to angle and material. The tests were impressive in their thoroughness. Temporary ramps were set up

in various parts of the station. Over these every employee, high and low, in the great army of terminal service, trudged for the purpose of "seeing how it felt." Girls from the telephone booth, men from the baggage room, boy pages and matrons, all these walked up and down the test ramps. Some went empty handed, some went arm in arm, some carried heavy bundles. Some were fat, some were lean, some tall, some short. Even the Directors of the road seized suitcases and trudged up and down in the business of gathering impressions. These were all duly noted down and the results compared. Then, too, the unsuspecting public was allowed to help in the work. Ramps were cunningly and unobtrusively put in the way of the regular stream of passengers, and the effect on the stream carefully noted by men stationed close by. Thus, the very readers of these lines, some of them, may have contributed their part to the fashioning of the new Grand Central Terminal.

Of course if the exact truth were told, the Grand Central is not a stairless terminal at all. There are flights of stairs, broad, sweeping, handsome stairs, leading from one floor to another. But these are off the direct line of passage between street and train. They are little sideways, short cuts from one part of the station to another. And the essential fact remains that it is quite possible to move from your trolley car to your Pullman car without finding stairs in your way. And that was the end desired.

The terminal builders were set against stairs. Stairs are always uncomfortable. They are worse than that when a crowd is using them. They are dangerous. A packed stairway is a fine breeding place for a panic and a disastrous one. The architects of the Grand Central shunned them, with something of the spirit of the man who said, when the first corkerew elevator, a half century ago, began its wheeling ascent in the old Fifth Avenue Hotel, of blessed memory, that stairs were doomed. The stairs have been banished, to all practical purposes, from the terminal, and banished so effectively that that last annoying and often perilous stop at the end is gone, for the station platform and the train platforms are built flush. Elevators in a terminal, soon to handle 100,000 persons a day, were impracticable. Hence the ramps.

As Virgil said of quite a different terminal, "facile decemus." As Napoleon rode on horseback up to the top of the Campanile, so a mounted policeman from "the finest" might easily ride from Forty-second Street to a train in the lowest level of the terminal

without disappointing or causing him to traverse. The station had actually been built to train, from Fifth to street. There need be little asking of the way. Follow the ramp and you get there.

"In the Heart of New York"



Vanderbilt Avenue Building

Northwest Cor. Vanderbilt Avenue, 42nd to 43rd Street
Right at the Grand Central Station

ON this commanding site, at the meeting point of the New York Central, New York, New Haven & Hartford, four subway systems, surface and elevated lines, the American Real Estate Company is erecting the handsome Vanderbilt Avenue Building, which will be

Ready for Occupancy May 1st, 1913

Besides being the most accessible building in New York, it will offer to tenants many exceptional advantages.

It will be within easy walking distance of the principal hotels, restaurants and clubs of New York.

It will provide direct, indoor passageway to the Grand Central and subways.

It will be in the heart of the most talked-about business section in the city, abutting from the most direct advertising value from the location.

The structure itself will be dignified and attractive both as to exterior and interior, and high-class tenants will find here most congenial quarters and agreeable surroundings.

Every modern convenience and 24-hour service.

For floor plans and information as to space, rentals, etc., you are invited to communicate with the

American Real Estate Company
527 Fifth Avenue New York

TERMINAL TRAINS RUN BY LOOP SYSTEM

THE great objection to the terminal or sub-station is the stalling of the locomotive, whether it be steam or electric. This difficulty in older times used to be overcome by the shunting or transfer table, but now the machines are so big as to make this impracticable.

The railroads are overcoming it by any one of several arrangements. Some of these are the loop system of tracks and the "Y" system which is used very effectively in the Union Station at St. Louis, although some students of the subject consider this system rather dangerous. Another method is that used by the Pennsylvania Station in New York, which virtually gives the advantage of a through station.

It is the loop system which has been decided upon as the one to be installed in the Grand Central Terminal for both express and suburban level, but this is not yet ready for use. Some further excavation, notably beneath the hospital now being torn down at the corner of Lexington Avenue and Forty-second Street, will be necessary. It will probably be all of another year before the many trains that daily pull in and out of the new terminal can make use of the loop convenience.

The great train capacity of the station will be due to this system. This is estimated at a maximum of two hundred trains an hour. Instead of trains coming in, discharging passengers, and backing out in the old cumbersome fashion, they will continue, when empty, around the loop under the southerly front of the station; and

then will run over to one side of the station yard, where they will be cleaned and made ready for the next trip.

The Grand Central authorities have decided on the loop system with a deal of confidence and enthusiasm. They say, in its behalf, that it will enable them to handle in the terminal all the train business of a six-track road.

There have been some, however, among those interested in the selection who have felt that something better might have been done. Among these is Mr. Whitney Warren, of Warren & Wetmore, chief architects of the terminal. Mr. Warren approved some form of the shuttle system in preference to the loop in the belief that a too heavy system might bring congestion, even in a "looped" terminal.

"The shuttle system is used to perfection on the Brooklyn Bridge, where the trains weave in and out in a wonderful fashion," Mr. Warren said the other day. "They can send 1,000 persons a minute over the Brooklyn Bridge, and no one pays any attention to it. It is really marvelous and not to be appreciated until it has been witnessed from the starter's tower."

The necessity of some such system as the "loop" is better appreciated when the magnitude of the train dispatcher's task at the new terminal is realized. It must be remembered that it has a total of sixty-eight tracks, of which forty-six have platforms, as against twenty-one tracks in the Pennsylvania Station, thirty-two in the South Station, Boston, or the St. Louis

Union Station, and against eighteen in the Frankfurt-on-the-Main Station, Germany.

These figures and comparisons are sufficient, even for the most inexperienced, to suggest that the new terminal has been built to last for many years to come. How many years no one knows. The traffic growth that has compelled the road to build in such rapid succession the homes that succeeded the little old station at Madison Square has been so enormous that all attempts to compute the future growth on the basis of the old advance have been simply staggering.

No one assumes that the present

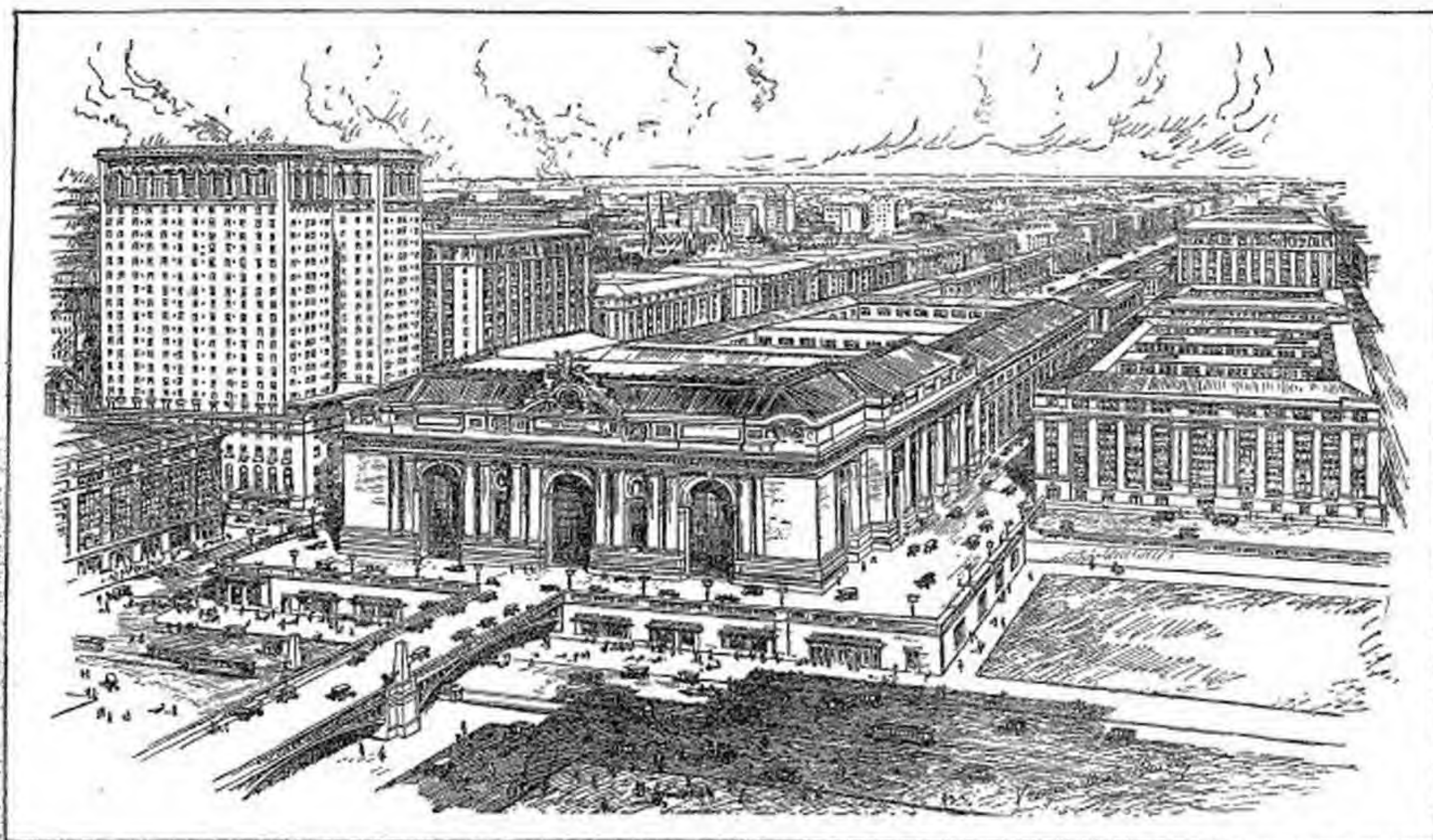
TERMINAL'S FIRST ARCHITECT

It has been said of the new Grand Central Terminal that no building in ancient or modern times has been made the subject of such an exhaustive study. Two New York firms of architects, Warren & Wetmore and Reed & Stem, collaborated on the work. To the former firm has been ascribed the credit for the broad outlines of design and the general aesthetic treatment of the subject, while Reed & Stem have been credited with what has been called the "engineer-architect" feature of the work. Everywhere to-day, the passerby hears applause for the outcome, and among good judges there is a general agreement that the collaboration was fruitful of good result.

At the outset and until little more than a year ago, Charles A. Reed,

head of the Reed & Stem firm, was at the head of the board of architects, but Mr. Reed died on Nov. 12, 1911, and since then the firm of Warren & Wetmore has brought the work to the conclusion signalled by to-day's opening. Throughout the architectural world it was recognized as a thing of peculiar pathos that, just on the eve of the emergence into visible result of this, the largest and most ambitious work of his long career, he should have had to leave it.

By official title Mr. Reed was executive head of the New York Central & Hudson River Railroad Company architects. He was graduated from the Massachusetts Institute of Technology, and the last thirty years of his life were devoted to railroad station building.



From the New Grand Central Terminal—

20th CENTURY LIMITED

—the world-famous "Overnight Train" which saves a business day between New York and Chicago and places these great cities only a good night's sleep apart.

To CHICAGO

Lv. New York 2.45 p.m. Lv. Chicago 12.40 p.m.
Ar. Chicago 9.45 a.m. Ar. New York 9.40 a.m.

"Water Level Route"—You Can Sleep

The WOLVERINE

—ensures a comfortable, refreshing journey overnight. The new Detroit River Tubes eliminate the necessity of ferry transfer at Detroit.

To DETROIT and CHICAGO

Lv. New York 5.00 p.m.
Lv. 125th St. Station . . . 5.09 p.m.
Ar. Detroit 7.15 a.m.
Ar. Chicago 2.00 p.m.

"Water Level Route"—You can sleep

LAKE SHORE LIMITED CLEVELAND LIMITED

—two splendid trains, each enabling you to leave New York after business hours and to arrive in Cleveland after a refreshing sleep, before business begins in the morning.

To CLEVELAND

Lake Shore Limited . . . 5.30 p.m.
Lv. Grand Central Terminal . . . 5.41 p.m.
Lv. 125th Street Station . . . 5.55 a.m.
Ar. 105th St. Station, Cleveland . . 7.15 a.m.
Ar. Union Station, Cleveland . . . 7.15 a.m.

Cleveland Limited . . . 6.30 p.m.
Lv. Grand Central Terminal . . . 6.40 p.m.
Ar. 105th St. Station, Cleveland . . 7.15 a.m.
Ar. Union Station, Cleveland . . . 7.30 a.m.

"Water Level Route"—You Can Sleep

THE WESTERNER

—the popular new train with no extra fare—pleasing daylight traveling and refreshing rest at night.

To CHICAGO, CINCINNATI, INDIANAPOLIS and ST. LOUIS

Lv. New York 2.00 p.m.
Lv. 125th St. Station . . . 2.11 p.m.
Ar. Chicago 5.00 p.m.
Ar. Cincinnati 10.50 a.m.
Ar. Indianapolis 10.50 a.m.
Ar. St. Louis 5.00 p.m.

"Water Level Route"—You Can Sleep

SOUTHWESTERN LIMITED

—the splendidly appointed train, affording excellent service to the Southwest.

To ST. LOUIS, CINCINNATI and INDIANAPOLIS

Lv. New York 4.00 p.m.
Ar. Cincinnati 10.50 a.m.
Ar. Indianapolis 10.50 a.m.
Ar. St. Louis 5.00 p.m.

"Water Level Route"—You can sleep

Railroad and Pullman tickets for all these trains delivered by Special Messenger without extra charge. For further information, address General Eastern Passenger Agent, 1216 Broadway.
New York Phone, 6316 Madison
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EMPIRE STATE EXPRESS

—the leading train of an unequalled New York State service—5 day-trains and 5 night-trains at convenient hours.

To BUFFALO

Lv. New York 8.30 a.m.
Ar. Buffalo 5.30 p.m.

Daylight ride along the Hudson

NEW YORK
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THE PHILIP LEWISOHN BUILDING

113-115-117-119 WEST 40TH ST. RUNNING THROUGH TO 114-116-118 WEST 41ST ST.

A Twenty-two Story Mammoth Office and Mercantile Building A Whole Block in Depth

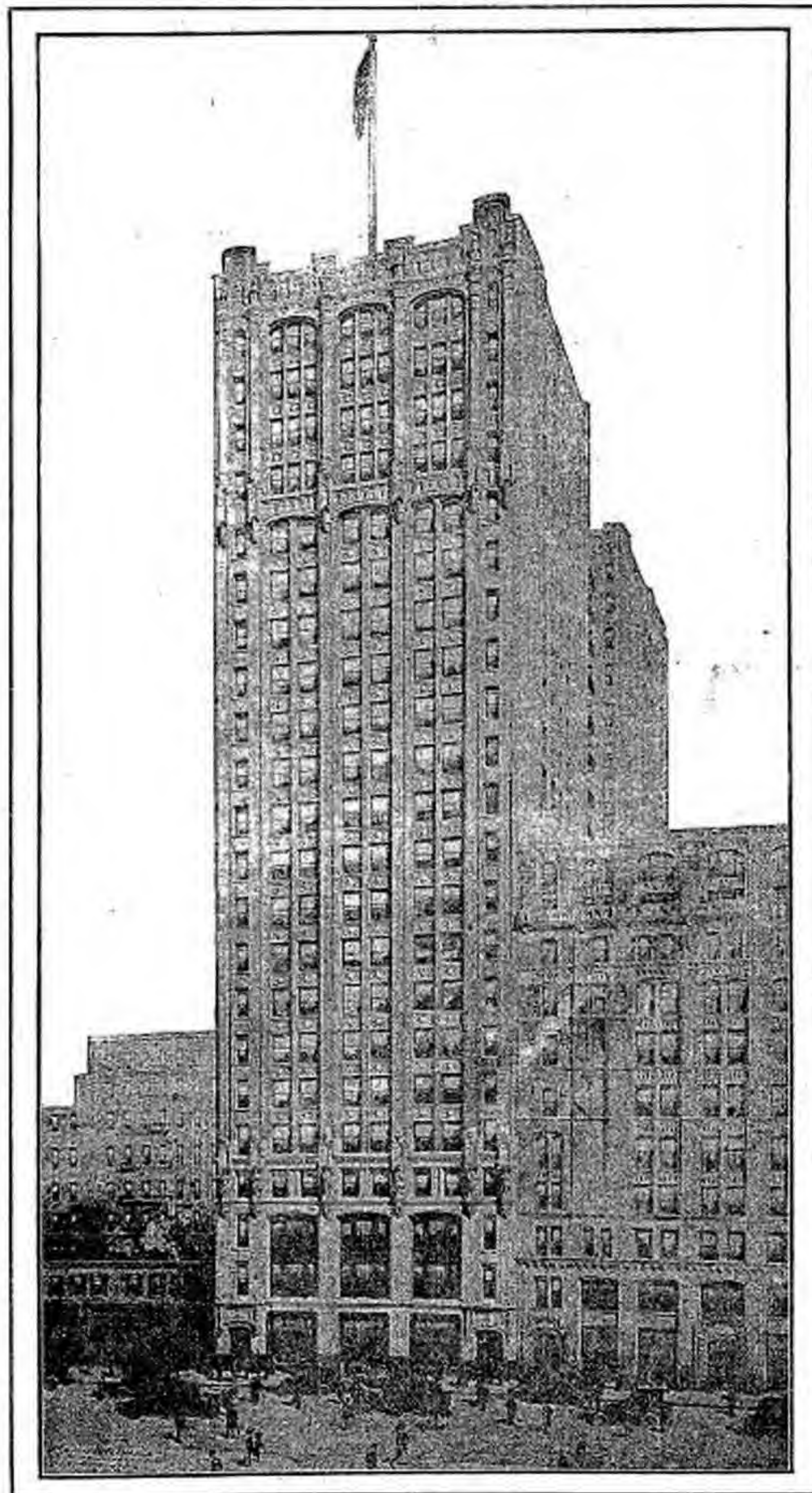
The only wholesale office building in this section.

Each entire floor suitable for large corporations as their executive offices.

Store and basement covering 28,000 sq. feet, and each floor 14,000 sq. feet.

Each entire floor splendidly adapted for large firms as their showrooms and offices

Exceptional light.



Absolutely fire-proof.

Sprinkler system and supervisory fire-alarm sprinkler system throughout the building.

Eight high-speed elevators.

Its construction incorporates every improvement and convenience the present day offers.

Low

Rentals
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Inspection invited.

Full particulars and floor plan can be had at

WEST 40TH & 41ST STREETS REALTY COMPANY, 88-90 FIFTH AVENUE

(OR YOUR OWN BROKER)

ONE SIGNAL TOWER CONTROLS SEVENTY-NINE ACRES OF TRACKS

SEVENTY-NINE acres of tracks over which come and go almost a thousand trains a day, all controlled from one central signal and switch tower!

To the railroad man that is one of the greatest of the mechanical triumphs that the completion of the New Grand Central Terminal typifies.

This tower is the central nerve point, the brain of the terminal. It gathers under one masterful control the bewildering train movements over the intricate web of tracks that lead into that great station.

Not a wheel can start to turn without the consent of that nerve centre. Not an incoming train, with its precious human load, can enter on its final approach to the platform until the terminal brain has signified its permission.

Needless to say, it is electricity that makes this terminal brain or nerve centre possible; that permits the operator in the tower to instantly reach here and there over the seventy-nine acres of tracks, throwing switches and setting signals.

This electric brain, or (to drop metaphor) this electric switch and signal tower, is at Fifth Street.

This central operating station is, in itself, worth going a long way to see.

It is the twentieth century idea in the electrical control of trains. It is the largest thing of its kind in the world, and to the perfection of its operation is committed the safety of millions of passengers a year.

In the old days, when the tracks were open to the sky, it took an army of men to throw the switches by hand in the terminal yards. Later, with the coming of the control of switches from the towers, it took a smaller army to throw the long levers back and forth. That was called the manual system.

Then came the automatic system that was worked by compressed air, then the combination of air and electricity. Now it is electricity alone that does the work.

This main signal tower is a four-story building below the street level, and houses the interlocking machines by which the switches and signals are operated. The machine for the suburban level is the largest ever constructed, and has four hundred levers, each of which operates a switch or signal. On the floor above is a machine with three hundred and sixty-two levers, operating the switches and signals on the express level.

To each forty levers a man is assigned who works under the instruction of a train director, who decides upon the track whereon each train is to be placed. The movement of the trains is indicated by little electric lights on a chart which is a fac simile of the track layout of the yards. As the trains pass over the switches the lights on the chart are extinguished and not relighted until the train has passed over the switch onto the next one.

To get an idea of how this intricate system is worked, let us visit a long, narrow room on the second floor of the signal tower. It is from this room that the switches and signals of the suburban level are operated.

In this room there is something that looks like a handsomely finished oaken case. It is about seventy-five feet long, about as high as an ordinary upright piano and about as wide.

Inside, but concealed from view, is a mass of electric wires—slender cords that resemble the seeming tangle at the back of a big telephone switch-board.

In front, breast high, is a double row of metal handles, each with a straight grip a hand's breadth long, one up and one down alternately.

Over at one side of the room, about halfway down its length, a man sits at a desk on which a telegraph instrument chatters intermittently. On a frame of ground glass beside him is etched a map of tracks in the terminal, spreading out fanwise from the mouth of the

tunnel under Park Avenue. A little circle about half the diameter of a dime marks the point where each track branches off.

As soon as the train "hits the hill"—as they call emerging from the tunnel mouth—the first bulb lights behind the first of these little circles. The tower director—the man at the telegraph key—knows that the train is coming, for he has been advised of its progress ever since it reached High Bridge or Mott Haven Junction and knows just what he is going to do with it, just where he is going to place it, as soon as it gets within his reach.

The tower director looks over to the men standing before the long row of handles and says, "124" or "53."

Each handle has a number above it. The man who has the number called within his division of the long box pulls the corresponding handle. As he does so he feels a tiny thrill that is the indication that the "high field" motor that controls the switch is doing the work. Then there is a gentle click, which is the second "indication" telling of the release of the armature magnet. A little square of round glass above the handle is illuminated and shows that the switch and signal are set. Another little circle lights up on the tower director's map, another number is called, and so on until the train or the engine is at the end of its journey.

Should the tower director call a wrong number or should one of the men misunderstand him and pull the wrong lever the electric indicators would show the error at once. Not only that, but that particular section of the interlocking system of switches and signals on the tracks outside would show it to the eye of the engineer.

Even if the engineer did not see it the train would be "tripped" automatically and brought to a stop until the error was rectified.

So accurately is the movement of the trains indicated by the little electric lights on the chart which is a fac-simile of the track layout of the yard, that the exact position of every train at every moment is known, even to the point of the last car's location and that of the front of the electric motor.

Nor is such a mass of important detail rendered burdensome and therefore confusing to the operators. Like the accurate vision of the eye, the brain of the terminal takes in without apparent effort the entire situation. "At a glance" is the only word for it.

The room is perhaps not solemn to the men, but it seems so to you. The air is heavy with duty. You do not speak. You would shrink back at the very touch of those great levers, nor can you be induced, hardly, to throw one, though you are told it is not in use and you are invited to throw it by way of explanation.

Should one of the operators turn to address you for a moment, you instinctively ask him not to take his eyes off his work.

Sometimes or other you may have been admitted to the wheelhouse of an ocean steamer. But you quickly realize that, except perhaps in the manoeuvres of a battle fleet, a pilothouse is nowhere near so momentous as is one of the signal rooms in this tower.

In a signal tower the emergency is not the exception; it is the whole thing. Every moment is emergency, either actual or possible.

"I hear people talk about emergency brakes," said one of these operators. "I see emergency wagons about the streets. The emergency hospital is down the avenue below my house. I smile. Why, I eat, drink and breathe emergency in my work. It is funny, but you cannot surprise me with anything. My wife knows that. If the baby fell out of the window my nerves would not jump. I really don't like it, for I can have no thrills. I am always cool. That is what my job has done for me."

In addition to the throwing of

switches and the setting of signals on the railroad tracks, electricity has been utilized for numerous other lesser signal devices.

Not the least important of them, and like so many of the others, an entirely new feature in terminal signalling, is the system of advising the gateman on the concourse when to open the gates and admit passengers to the trains.

An electric lamp is sunk in the hand-rail in front of each gate and when the train is ready to receive passengers the conductor presses a button, illuminating this lamp, thereby notifying the gateman that all is ready. At the moment the train is due to leave the gateman will close the gate and press a button located on the same hand-rail, which will illuminate a lamp on the platform near where the conductor will stand, thereby notifying him that the gate is closed and he may proceed.

Thus far mention has only been made of the use of electricity in connection with the signal and switch system of the new terminal.

Although in this quick-moving age it is a comparatively old subject that was thrashed out a few years ago, some mention should be made of the use of electricity as the motive power in this mammoth station.

As has been said in a previous article in this section, it was the substitution of electrical for steam traction that made possible the utilization of the air rights by the building of a terminal yard and station entirely below the street level.

The important question then presented itself as to what system of electric traction would best meet the conditions.

President Newman quickly realized how vital a question this was. There was no precedent whatever to go upon. The conditions were new; the problem quite untried. Moreover, at this time there were two great rival systems of electric traction in the field, the direct current and the alternating current.

President Newman organized a special board of electrical and engineering experts to thrash out the question. It took them two years to come to their final conclusion that, all things considered, the direct-current, third-rail system would best meet the conditions.

The New York, New Haven & Hartford Company also has its terminal at the Grand Central Station. The management determined to electrify its main lines as far as Stamford, Conn., and, after mature consideration, it decided to adopt the alternating-current, high-tension system, using 11,000 volts in an overhead line.

The New York Central suburban electric zone was to extend thirty-four miles to Croton on the main line and thirty miles to White Plains on the Harlem.

The direct-current system, it is said, has the advantages that the third rail affords a more compact and ship-shape system of construction; that the pressure is lower; and that the risks of accident are reduced practically to the vanishing point.

The company has done the electrical world great service by publishing very complete details of the original cost, cost of operation, and the risks and accidents of operation, thereby placing the art of steam, trunk-line electrification in possession of a large amount of very useful data.

As has been said, the buildings in the terminal area are erected over the tracks of the yards, and consequently where ordinarily the heating, lighting and power machinery is located trains are running back and forth. To overcome this condition, a power and heating plant of great magnitude was erected at Fifth Street, between Lexington and Park Avenues, and therein is assembled the machinery for lighting and heating all the buildings in the terminal, both present and prospective. The hot water used in heating the general office, Post Office and station buildings travels over a mile before it returns to the heating plant.

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